

SEQUENCE LISTING

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 5 <120> Screening process for hydantoin racemases
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 40 20 25 30
 Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
 35 40 45
 45 Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
 50 55 60
 Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Gly Asp
 65 70 75 80
 50 Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly
 85 90 95
 Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe
 55 100 105 110
 Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu
 115 120 125

Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro
 130 135 140
 5 Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu
 145 150 155 160
 Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu
 165 170 175
 10 Ser Ile Val Leu Gly Cys Ala Gly Met Val Gly Phe Ala Arg Gln Leu
 180 185 190
 Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys
 195 200 205
 15 Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala
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 20 Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu
 225 230 235
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 1 5 10 15
 40 tcg gtt gcg gac gca gca caa caa gtt gtc gcg acc ggc acc ata att 96
 Ser Val Ala Asp Ala Ala Gln Gln Val Val Ala Thr Gly Thr Ile Ile
 20 25 30
 45 tct gcc atc aac ccc tcc aga gga ccc gcc gtc att gaa ggc agc ttt 144
 Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
 35 40 45
 50 gac gaa gca ctg gcc acg ttc cat ctc att gaa gag gtg gag cgc gct 192
 Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
 50 55 60
 55 gag cgg gaa aac ccg ccc gac gcc tac gtc atc gca tgt ttc agg gat 240
 Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Arg Asp
 65 70 75 80
 ccg gga ctt gac gcg gtc aag gag ctg act gac agg cca gtg gta gga 288
 Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly
 85 90 95

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      gtt gcc gaa gct gca atc cac atg tct tca ttc gtc gcg gcc acc ttc 336
      Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe
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5      tcc att gtc agc atc ctc ccg agg gtc agg aaa cat ctg cac gaa ctg 384
      Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu
              115                      120                      125

10     gta cgg caa gcg ggg gcg acg aat cgc ctc gcc tcc atc aag ctc cca 432
      Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro
              130                      135                      140

15     aat ctg ggg gtg atg gcc ttc cat gag gac gaa cat gcc gca ctg gag 480
      Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu
      145                      150                      155                      160

20     acg ctc aaa caa gcc gcc aag gag gcg gtc cag gag gac ggc gcc gag 528
      Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu
              165                      170                      175

25     tcg ata gtg ctc gga tgc gcc ggc atg gtg ggg ttt gcg cgt caa ctg 576
      Ser Ile Val Leu Gly Cys Ala Gly Met Val Val Gly Phe Ala Arg Gln Leu
              180                      185                      190

30     agc gac gaa ctc ggc gtc cct gtc atc gac ccc gtc gag gca gct tgc 624
      Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys
              195                      200                      205

35     cgc gtg gcc gag agt ttg gtc gct ctg ggc tac cag acc agc aaa gcg 672
      Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala
              210                      215                      220

711    aac tcg tat caa aaa ccg aca gag aag cag tac ctc tag
      Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu
      225                      230                      235

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      <213> Artificial sequence
      <223> Description of the artificial sequence:1BG7

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50     Ser Val Ala Asp Ala Ala Gln Gln Val Val Ala Thr Gly Thr Ile Ile
              20                      25                      30

55     Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
              35                      40                      45

60     Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
              50                      55                      60

65     Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Arg Asp
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        <213> Artificial sequence

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        Met Arg Ile Leu Val Ile Asn Pro Asn Ser Ser Ser Ala Leu Thr Glu
           1             5             10             15

50      tcg gtt gcg gac gca gca caa caa gtt gtc gcg acc ggc acc ata att      96
        Ser Val Ala Asp Ala Ala Gln Gln Val Val Ala Thr Gly Thr Ile Ile
                   20             25             30

55      tct gcc atc aac ccc tcc aga gga ccc gcc gtc att gaa ggc agc ttt      144
        Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
                   35             40             45

        gac gaa gca ctg gcc acg ttc cat ctc att gaa gag gtg gag cgc gct      192
        Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
           50             55             60

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5      gag cgg gaa aac ccg ccc gac gcc tac gtc atc gca tgt ttc gag gat 240
      Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Glu Asp
      65              70              75              80

10     ccg gga ctt gac gcg gtc aag gag ctg act gac agg cca gtg gta gga 288
      Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly
      85              90              95

15     gtt gcc gaa gct gca atc cac atg tct tca ttc gtc gcg gcc acc ttc 336
      Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe
      100             105             110

20     tcc att gtc agc atc ctc ccg agg gtc agg aaa cat ctg cac gaa ctg 384
      Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu
      115             120             125

25     gta cgg caa gcg ggg gcg acg aat cgc ctc gcc tcc atc aag ctc cca 432
      Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro
      130             135             140

30     aat ctg ggg gtg atg gcc ttc cat gag gac gaa cat gcc gca ctg gag 480
      Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu
      145             150             155

35     acg ctc aaa caa gcc gcc aag gag gcg gtc cag gag gac ggc gcc gag 528
      Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu
      165             170             175

40     tcg ata gtg ctc gga tgc gcc ggc atg gtg ggg ttt gcg cgt caa ctg 576
      Ser Ile Val Leu Gly Cys Ala Gly Met Val Gly Phe Ala Arg Gln Leu
      180             185             190

45     agc gac gaa ctc ggc gtc cct gtc atc gac ccc gtc gag gca gct tgc 624
      Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys
      195             200             205

50     cgc gtg gcc gag agt ttg gtc gct ctg ggc tac cag acc agc aaa gcg 672
      Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala
      210             215             220

55     aac tcg tat caa aaa ccg aca gag aag cag tac ctc tag 711
      Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu
      225             230             235

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<223> Description of the artificial sequence:3CH11

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Ser Val Ala Asp Ala Ala Gln Gln Val Val Ala Thr Gly Thr Ile Ile
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Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
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 5 Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
 50 55 60
 Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Glu Asp
 65 70 75 80
 10 Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly
 85 90 95
 Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe
 100 105 110
 15 Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu
 115 120 125
 Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro
 20 130 135 140
 Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu
 145 150 155 160
 25 Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu
 165 170 175
 Ser Ile Val Leu Gly Cys Ala Gly Met Val Gly Phe Ala Arg Gln Leu
 180 185 190
 30 Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys
 195 200 205
 Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala
 35 210 215 220
 Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu
 225 230 235
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	tcg gtt gcg gac gca gca caa caa gtt gtc gcg acc ggc acc ata att	96
	Ser Val Ala Asp Ala Ala Gln Gln Val Val Ala Thr Gly Thr Ile Ile	
	20 25 30	
5	tct gcc atc aac ccc tcc aga gga ccc gcc gtc att gaa ggc agc ttt	144
	Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe	
	35 40 45	
10	gac gaa gca ctg gcc acg ttc cat ctc att gaa gag gtg gag cgc gct	192
	Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Val Glu Arg Ala	
	50 55 60	
15	gag cgg gaa aac ccg ccc gac gcc tac gtc atc gca tgt ttc cag gat	240
	Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Gln Asp	
	65 70 75 80	
20	ccg gga ctt gac gcg gtc aag gag ctg act gac agg cca gtg gta gga	288
	Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly	
	85 90 95	
25	gtt gcc gaa gct gca atc cac atg tct tca ttc gtc gcg gcc acc ttc	336
	Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe	
	100 105 110	
30	tcc att gtc agc atc ctc ccg agg gtc agg aaa cat ctg cac gaa ctg	384
	Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu	
	115 120 125	
35	gta cgg caa gcg ggg gcg acg aat cgc ctc gcc tcc atc aag ctc cca	432
	Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro	
	130 135 140	
40	aat ctg ggg gtg atg gcc ttc cat gag gac gaa cat gcc gca ctg gag	480
	Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu	
	145 150 155 160	
45	acg ctc aaa caa gcc gcc aag gag gcg gtc cag gag gac ggc gcc gag	528
	Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu	
	165 170 175	
50	tcg ata gtg ctc gga tgc gcc ggc atg gtg ggg ttt gcg cgt caa ctg	576
	Ser Ile Val Leu Gly Cys Ala Gly Met Val Gly Phe Ala Arg Gln Leu	
	180 185 190	
55	agc gac gaa ctc ggc gtc cct gtc atc gac ccc gtc gag gca gct tgc	624
	Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys	
	195 200 205	
60	cgc gtg gcc gag agt ttg gtc gct ctg ggc tac cag acc agc aaa gcg	672
	Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala	
	210 215 220	
65	aac tcg tat caa aaa ccg aca gag aag cag tac ctc tag	711
	Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu	
	225 230 235	

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<211> 237

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<213> Artificial sequence

<223> Description of the artificial sequence:AE3

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10      20              25              30

Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
      35              40              45

15  Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
      50              55              60

Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Gln Asp
      65              70              75              80

20  Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly
      85              90              95

Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe
25      100              105              110

Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu
      115              120              125

30  Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro
      130              135              140

Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu
35  145              150              155              160

Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu
      165              170              175

Ser Ile Val Leu Gly Cys Ala Gly Met Val Gly Phe Ala Arg Gln Leu
40      180              185              190

Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys
      195              200              205

45  Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala
      210              215              220

Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu
50  225              230              235

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<211> 711

<212> DNA

55 <213> Artificial sequence

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<223> Description of the artificial sequence:BB5

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<221> CDS

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10 tcg gtt gcg gac gca gca caa caa gtt gtc gcg acc ggc acc ata att 96
 Ser Val Ala Asp Ala Ala Gln Gln Val Val Ala Thr Gly Thr Ile Ile
 20 25 30

15 tct gcc atc aac ccc tcc aga gga ccc gcc gtc att gaa ggc agc ttt 144
 Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
 35 40 45

20 gac gaa gca ctg gcc acg ttc cat ctc att gaa gag gtg gag cgc gct 192
 Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
 50 55 60

25 gag cgg gaa aac ccg ccc gac gcc tac gtc atc gca tgt ttc ttg gat 240
 Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Leu Asp
 65 70 75 80

ccg gga ctt gac gcg gtc aag gag ctg act gac agg cca gtg gta gga 288
 Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly
 85 90 95

30 gtt gcc gaa gct gca atc cac atg tct tca ttc gtc gcg gcc acc ttc 336
 Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe
 100 105 110

35 tcc att gtc agc atc ctc ccg agg gtc agg aaa cat ctg cac gaa ctg 384
 Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu
 115 120 125

40 gta cgg caa gcg ggg gcg acg aat cgc ctc gcc tcc atc aag ctc cca 432
 Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro
 130 135 140

45 aat ctg ggg gtg atg gcc ttc cat gag gac gaa cat gcc gca ctg gag 480
 Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu
 145 150 155 160

acg ctc aaa caa gcc gcc aag gag gcg gtc cag gag gac ggc gcc gag 528
 Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu
 165 170 175

50 tcg ata gtg ctc gga tgc gcc ggc atg gtg ggg ttt gcg cgt caa ctg 576
 Ser Ile Val Leu Gly Cys Ala Gly Met Val Gly Phe Ala Arg Gln Leu
 180 185 190

55 agc gac gaa ctc ggc gtc cct gtc atc gac ccc gtc gag gca gct tgc 624
 Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys
 195 200 205

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cgc gtg gcc gag agt ttg gtc gct ctg ggc tac cag acc agc aaa gcg      672
Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala
    210                      215                      220

5  aac tcg tat caa aaa ccg aca gag aag cag tac ctc tag      711
Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu
    225                      230                      235

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    <213> Artificial sequence
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20 Ser Val Ala Asp Ala Ala Gln Gln Val Val Ala Thr Gly Thr Ile Ile
    20                      25                      30

Ser Ala Ile Asn Pro Ser Arg Gly Pro Ala Val Ile Glu Gly Ser Phe
    35                      40                      45

25 Asp Glu Ala Leu Ala Thr Phe His Leu Ile Glu Glu Val Glu Arg Ala
    50                      55                      60

30 Glu Arg Glu Asn Pro Pro Asp Ala Tyr Val Ile Ala Cys Phe Leu Asp
    65                      70                      75                      80

Pro Gly Leu Asp Ala Val Lys Glu Leu Thr Asp Arg Pro Val Val Gly
    85                      90                      95

35 Val Ala Glu Ala Ala Ile His Met Ser Ser Phe Val Ala Ala Thr Phe
    100                      105                      110

Ser Ile Val Ser Ile Leu Pro Arg Val Arg Lys His Leu His Glu Leu
    115                      120                      125

40 Val Arg Gln Ala Gly Ala Thr Asn Arg Leu Ala Ser Ile Lys Leu Pro
    130                      135                      140

45 Asn Leu Gly Val Met Ala Phe His Glu Asp Glu His Ala Ala Leu Glu
    145                      150                      155                      160

Thr Leu Lys Gln Ala Ala Lys Glu Ala Val Gln Glu Asp Gly Ala Glu
    165                      170                      175

50 Ser Ile Val Leu Gly Cys Ala Gly Met Val Gly Phe Ala Arg Gln Leu
    180                      185                      190

Ser Asp Glu Leu Gly Val Pro Val Ile Asp Pro Val Glu Ala Ala Cys
    195                      200                      205

55 Arg Val Ala Glu Ser Leu Val Ala Leu Gly Tyr Gln Thr Ser Lys Ala
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Asn Ser Tyr Gln Lys Pro Thr Glu Lys Gln Tyr Leu
 225 230 235

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5  <210> 11
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